

Claims

1. A lever handle return spring assembly for a cylindrical lock of the type adapted for installation in a bored opening in a door, the lever handle return spring assembly comprising:

a support plate including:

an outer region for making supporting contact with a face of the door, the outer region having a diameter greater than a diameter of the bored opening in the door and at least one bolt hole located in the outer region; and

an inner region having a diameter less than the diameter of the bored opening in the door, the inner region being cylindrically depressed relative to the outer region to extend at least partially into the bored opening in the door when the support plate is installed, the inner region including at least one spring stop tab extending axially away from the inner region;

a pair of compression springs;

a cylindrical spring housing having a diameter less than the diameter of the inner region of the support plate such that the spring housing extends at least partially into the cylindrically depressed inner region of the support plate, the spring housing being adapted to be driven by a lever handle and including:

a pair of annular spring channels corresponding to and receiving the pair of compression springs, the spring channels opening towards the inner region of the support plate to hold the springs between the spring housing, the support plate and ends of the spring channels,

the spring channels being connected together by at least one slot sized to receive the at least one spring stop tab whereby the at least one spring stop tab passes between the spring channels to alternately compress the compression springs as the spring housing is alternately rotated in opposite directions relative to the support plate; and

30 at least one stop lug radially projecting from the spring housing;
31 a cover plate including:
32 an outer region connected to the outer region of the support plate, the outer
33 region of the cover plate having at least one bolt hole for alignment with
34 the bolt hole in the outer region of the support plate; and
35 an inner region forming a cover to retain the spring housing and the
36 compression springs in the cylindrically depressed inner region of the
37 support plate; and
38 at least one stop extending from the cover plate towards the support plate,
39 the at least one stop on the cover plate providing interfering engagement
40 with the at least one stop lug on the spring housing to limit rotation of
41 the spring housing; and
42 at least one through-bolt extending through the bolt holes in the cover plate and
43 support plate.

1 2. The lever handle return spring assembly for a cylindrical lock according to
2 claim 1 wherein the inner region of the support plate is internally threaded for
3 threaded engagement with the cylindrical lock.

1 3. The lever handle return spring assembly for a cylindrical lock according to
2 claim 1 wherein the support plate includes at least one lock tab for engaging the
3 cylindrical lock to prevent rotation of the cylindrical lock relative to the support
4 plate.

1 4. The lever handle return spring assembly for a cylindrical lock according to
2 claim 3 wherein the support plate includes a second lock tab opposite the at least
3 one lock tab for engaging the cylindrical lock on opposite sides thereof to prevent
4 rotation of the cylindrical lock relative to the support plate.

1 5. The lever handle return spring assembly for a cylindrical lock according to
2 claim 1 wherein the support plate is formed from an initially flat sheet material.

1 6. The lever handle return spring assembly for a cylindrical lock according to
2 claim 5 wherein the support plate is formed by stamping and the initially flat sheet
3 material is steel.

1 7. The lever handle return spring assembly for a cylindrical lock according to
2 claim 6 wherein the at least one stop extending from the cover plate is formed by
3 stamping a portion of the cover plate between two opposed slots in an outer
4 perimeter of the inner region of the cover plate such that the at least one stop
5 extends from the cover plate towards the support plate and into interfering
6 engagement with the at least one stop lug on the spring housing.

1 8. The lever handle return spring assembly for a cylindrical lock according to
2 claim 1 wherein the cover plate is formed from an initially flat sheet material.

1 9. The lever handle return spring assembly for a cylindrical lock according to
2 claim 8 wherein the cover plate is formed by stamping and the initially flat sheet
3 material is steel.

1 10. The lever handle return spring assembly for a cylindrical lock according to
2 claim 1 wherein the support plate is riveted to the support plate.

1 11. The lever handle return spring assembly for a cylindrical lock according to
2 claim 1 further including:

3 a spacer bushing extending through a central opening in the cover plate, the
4 spacer bushing engaging the spring housing on one side of the cover plate
5 and a lever handle on an opposite side of the cover plate; and
6 a friction bushing positioned around the spacer bushing.

1 12. The lever handle return spring assembly for a cylindrical lock according to
2 claim 11 wherein the friction bushing includes a cylindrical surface positioned
3 between the spacer bushing and the cover plate and an annular surface positioned
4 between the spring housing and the cover plate, the cylindrical surface providing a
5 radial bearing between the spacer bushing and the cover plate and the annular
6 surface providing an axial thrust bearing between the spring housing and the cover
7 plate.

1 13. The lever handle return spring assembly for a cylindrical lock according to
2 claim 12 wherein the friction bushing is made of a self-lubricating polymer.

1 14. The lever handle return spring assembly for a cylindrical lock according to
2 claim 1 wherein the bolt holes in the cover plate and support plate align with a
3 corresponding through-hole in the door, the at least one through-bolt extending
4 through the bolt holes in the cover plate, support plate and the through-hole in the
5 door.

1 15. The lever handle return spring assembly for a cylindrical lock according to
2 claim 14 wherein the at least one through-bolt extends through the bolt holes in the
3 cover plate, support plate and the through-hole in the door and engages a
4 corresponding stud.

1 16. A lever handle return spring assembly for a cylindrical lock of the type
2 adapted for installation in a bored opening in a door, the lever handle return spring
3 assembly comprising:

4 a first support plate including:

5 an outer region for making supporting contact with a first face of the door,
6 the outer region having a diameter greater than a diameter of the bored
7 opening in the door and at least two bolt holes located in the outer

8 region for alignment with corresponding through-holes in the door
9 located radially outside the bored opening in the door; and
10 an inner region having a diameter less than the diameter of the bored
11 opening in the door, the inner region being cylindrically depressed
12 relative to the outer region to extend at least partially into the bored
13 opening in the door when the first support plate is installed, the inner
14 region including a first pair of spring stop tabs extending axially away
15 from the inner region and having a central threaded opening for threaded
16 engagement with the cylindrical lock;
17 a first pair of compression springs;
18 a first cylindrical spring housing having a diameter less than the diameter of the
19 inner region of the support plate such that the first spring housing extends at
20 least partially into the cylindrically depressed inner region of the first support
21 plate, the first spring housing being adapted to be driven by a first lever
22 handle and including:
23 a first pair of annular spring channels corresponding to and receiving the first
24 pair of compression springs, the first spring channels opening towards the
25 inner region of the first support plate to hold the first pair of compression
26 springs between the first spring housing, the first support plate and ends
27 of the first pair of spring channels,
28 the first pair of spring channels being connected together at opposite ends by
29 slots sized to receive the first pair of spring stop tabs whereby the first
30 pair of spring stop tabs pass between the first pair of spring channels to
31 alternately compress the first pair of compression springs as the first
32 spring housing is alternately rotated in opposite directions relative to the
33 first support plate; and
34 a first pair of stop lugs radially projecting from the first spring housing;
35 a first cover plate including:
36 an outer region connected to the outer region of the first support plate, the
37 outer region of the first cover plate having at least two bolt holes for

alignment with the at least two bolt holes in the outer region of the first support plate and the through-holes in the door; and
an inner region forming a cover to retain the first spring housing and the first pair of compression springs in the cylindrically depressed inner region of the first support plate; and
a first pair of stops extending from the cover plate towards the support plate, the first pair of stops on the cover plate providing interfering engagement with the first pair of stop lugs on the spring housing to limit rotation of the spring housing;
a second support plate having a pair of lock tabs for engaging the cylindrical lock to prevent rotation of the cylindrical lock relative to the second support plate, the second support plate including:
an outer region for making supporting contact with a second face of the door, the outer region having a diameter greater than a diameter of the bored opening in the door and at least two bolt holes located in the outer region for alignment with the bolt holes in the first support plate; and
an inner region having a diameter less than the diameter of the bored opening in the door, the inner region being cylindrically depressed relative to the outer region to extend at least partially into the bored opening in the door when the second support plate is installed, the inner region including a second pair of spring stop tabs extending axially away from the inner region;
a second pair of compression springs;
a second cylindrical spring housing having a diameter less than the diameter of the inner region of the support plate such that the second spring housing extends at least partially into the cylindrically depressed inner region of the second support plate, the second spring housing being adapted to be driven by a second lever handle and including:
a second pair of annular spring channels corresponding to and receiving the second pair of compression springs, the second spring channels opening

68 towards the inner region of the second support plate to hold the second
69 pair of compression springs between the second spring housing, the
70 second support plate and ends of the second pair of spring channels,
71 the second pair of spring channels being connected together at opposite
72 ends by slots sized to receive the second pair of spring stop tabs whereby
73 the second pair of spring stop tabs pass between the second pair of
74 spring channels to alternately compress the second pair of compression
75 springs as the second spring housing is alternately rotated in opposite
76 directions relative to the second support plate; and
77 a second pair of stop lugs radially projecting from the second spring housing;
78 a second cover plate including:
79 an outer region connected to the outer region of the second support plate,
80 the outer region of the second cover plate having at least two bolt holes
81 for alignment with the at least two bolt holes in the outer region of the
82 second support plate and the through-holes in the door; and
83 an inner region forming a cover to retain the second spring housing and the
84 second pair of compression springs in the cylindrically depressed inner
85 region of the second support plate; and
86 a second pair of stops extending from the cover plate towards the support
87 plate, the second pair of stops on the cover plate providing interfering
88 engagement with the second pair of stop lugs on the spring housing to
89 limit rotation of the spring housing;
90 at least one through-bolt extending through the bolt holes in the cover plate and
91 support plate and into the through-hole in the door.

- 1 17. The lever handle return spring assembly for a cylindrical lock according to
- 2 claim 16 wherein the first and second support plates and the first and second cover
- 3 plates are formed from initially flat sheet materials.

1 18. The lever handle return spring assembly for a cylindrical lock according to
2 claim 17 wherein the first and second support plates and the first and second cover
3 plates are formed by stamping and the initially flat sheet materials are steel.

1 19. The lever handle return spring assembly for a cylindrical lock according to
2 claim 16 further including:

3 a first spacer bushing extending through a central opening in the first cover
4 plate, the first spacer bushing engaging the first spring housing on one side
5 of the first cover plate and a first lever handle on an opposite side of the first
6 cover plate;

7 a first friction bushing positioned around the first spacer bushing;

8 a second spacer bushing extending through a central opening in the second
9 cover plate, the second spacer bushing engaging the second spring housing
10 on one side of the second cover plate and a second lever handle on an
11 opposite side of the second cover plate; and

12 a second friction bushing positioned around the second spacer bushing.

1 20. The lever handle return spring assembly for a cylindrical lock according to
2 claim 16 further including first and second friction bushings constructed of a self-
3 lubricating polymer, the first and second friction bushings having respective first
4 and second cylindrical surfaces contacting the first and second cover plates, the first
5 and second cylindrical surfaces acting as radial bearings to reduce clearance in a
6 radial direction, the first and second friction bushings also having respective first
7 and second annular surfaces contacting the first and second cover plates, the first
8 and second annular surfaces acting as corresponding first and second axial thrust
9 bearings to reduce clearance in an axial direction.